Notice No.7

Rules and Regulations for the Classification of Ships, July 2019

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: June 2020

Amendments to	**Effective date**	**IACS/IMO implementation (if applicable)**
Part 3, Chapter 1, Sections 6 & 7	1 July 2020	1 July 2020
Part 3, Chapter 9, Sections 3 & 10	1 July 2020	N/A
Part 3, Chapter 10, Section 2	1 July 2020	1 July 2020
Part 3, Chapter 11, Section 2	1 July 2020	1 July 2020
Part 3, Chapter 13, Sections 7 & 8	1 July 2020	1 July 2020
Part 4, Chapter 1, Section 5	1 July 2020	NA
Part 4, Chapter 2, Section 10	1 July 2020	N/A
Part 4, Chapter 7, Sections 3 & 10	1 July 2020	1 July 2020
Part 4, Chapter 8, Section 15	1 July 2020	N/A
Part 4, Chapter 12, Sections 1, 2 & 8	1 July 2020	NA

Lloyd's Register

Part 3, Chapter 1
General

■ *Section 6*
Definitions

6.1 Principal particulars

6.1.5 Draught, *T*, is the ~~summer~~scantling draught, in metres, measured from top of keel, ~~or a greater value if such a value has been specified as 'scantling draught'~~and is not to be taken as less than the 'summer draught'. Both of the draughts are to be indicated on the midship plan, irrespective of whether or not they are of the same value.

■ *Section 7*
Equipment Number

7.1 Calculation of Equipment Number

7.1.8 For sailing passenger ships, the equipment requirement is to be in accordance with the letter and numeral two grades higher than that corresponding to the calculated Equipment Numeral.

Part 3, Chapter 9
Special Features

■ *Section 3*
Decks loaded by wheeled vehicles

Table 9.3.3 Tyre correction factor, n

Number of wheels in idealised patch	Pneumatic tyres	Solid rubber tyres	Steel or solid tyres
1	0,6	0,8	1,0
2 or more	0,75	0,9	1,0

3.5 Deck longitudinals and beams

Existing paragraph 3.5.1 and Table 9.3.4 are to be deleted and replaced with the following.

3.5.1 The scantlings of vehicle deck stiffeners are to satisfy the most severe arrangement of print wheel loads.

3.5.2 The minimum requirements for section modulus, inertia and web area of vehicle deck secondary stiffeners subject to wheel loading, are to be calculated in accordance with *Table 9.3.4 Secondary stiffener requirements* using the loads defined in *Table 9.3.7 Design load cases*.

3.5.3 When two or more load areas are located simultaneously on the same stiffener span, or where decks are designed for the carriage of wheeled vehicles only, the scantling requirements are to be specially considered on the basis of direct calculation, assuming 100 per cent end fixity in association with the loads given in *Table 9.3.7 Design load cases* and the structural design factors given in *Table 9.3.6 Structural design factors (normal stress)*. The load area is defined as the footprint of an individual wheel or the area enclosing a group of wheels when the distance between footprints is less than the smaller dimension of the individual prints.

3.5.4 The vehicles are to be positioned so as to produce the most severe loading condition for each structural member under consideration.

Table 9.3.4 Secondary stiffener requirements

Scantling requirement	Load case	
	d ≤ *l*	*d* > *l*
Section modulus *Z*, in cm^3	$Z = \left(\frac{k_w F_{tys}(3l^2 - d^2)}{f_{bdg} l} + \frac{P_{tyw} s l^2}{10}\right) \frac{10^3}{f_\sigma \sigma_o}$	$Z = \left(\frac{k_w F_{tys} l^2}{10d} + \frac{P_{tyw} s l^2}{10}\right) \frac{10^3}{f_\sigma \sigma_o}$
Inertia, *I*, in cm^4	$I = \left(\frac{k_w F_{tys}(2l^3 - 2d^2 l + d^3)}{f_{bdg} l} + \frac{P_{tyw} s l^3}{288}\right) \frac{10^5}{f_\delta E}$	$I = \left(\frac{k_w F_{tys} l^3}{f_{bdg} d} + \frac{P_{tyw} s l^3}{288}\right) \frac{10^5}{f_\delta E}$
Web area, *A*w, in cm^2	$A_w = \left(\frac{k_w F_{tys}(m^3 - 2m^2 + 2)}{f_{bdg}} + \frac{P_{tyw} s l}{2}\right) \frac{10}{f_\tau \tau_o}$	$A_w = \left(\frac{k_w F_{tys} l}{2d} + \frac{P_{tyw} s l}{2}\right) \frac{10}{f_\tau \tau_o}$
	where $m = d/l$	

Symbols

l = overall secondary stiffener length, in metres

s = stiffener spacing, in metres

d = dimension of load area parallel to stiffener axis, in metres

E = Young's Modulus of steel, to be taken as 20600 N/mm^2

w = dimension of load area perpendicular to stiffener axis, in metres

k_w = lateral loading factor

= 1 for *w* ≤ *s*

= *s*/*w* for *w* > *s*

F_{tys} = point load given in *Table 9.3.7 Design load cases*, in kN

P_{tyw} = design deck load given in *Table 9.3.7 Design load cases*, in kN/m^2

f_σ, f_δ, f_τ = structural design factors given in *Table 9.3.6 Structural design factors (normal stress)*

f_{bdg} = bending moment factor given in *Table 9.3.5 Bending moment factor*

σ_o = specified minimum yield strength of the material, in N/mm^2

τ_o = shear strength of the material, in N/mm^2

$= \frac{\sigma_o}{\sqrt{3}}$

Table 9.3.5 Bending moment factor

Scantling requirement	Deck stiffening	Hatch cover stiffening
Section modulus	24	20
Inertia	384	288
Web area	2	2

Table 9.3.6 Structural design factors (normal stress)

Scenario	Structural design factor
1. Loading by fork lift trucks on general purpose cargo decks	1,5
2. Loading by wheeled vehicles and other deck cargo	0,75
3. Loading by wheeled vehicles only	0,75
4. Loading by wheeled vehicles only on longitudinally effective structure	0,525
Note Structural design factors for shear and equivalent stress are to be derived as appropriate.	

Table 9.3.7 Design load cases

Scenario		Loading	
		UDL, P_{tyw}, in kN/m^2	Point load, F_{tys}, in kN
1. Loading by fork lift trucks on general purpose cargo decks		9,81*h*/*C*	P_w
2. Loading by wheeled vehicles and other deck cargo		9,81*h*/*C* where *h* need not be taken greater than 2,5 metres	$(1+na_z)P_w$
3. Loading by wheeled vehicles only, *see* Note	Internal decks	-	$(1+na_z)P_w$
	Exposed decks	2,16	$(1+na_z)P_w$
4. Loading by wheeled vehicles only on longitudinally effective structure, *see* Note	Internal decks	-	$(1+na_z)P_w$
	Exposed decks	2,16	$(1+na_z)P_w$
Symbols			
P_w	is the load, in kN, on the tyre print. For closely spaced wheels, the shaded area shown in *Figure 9.3.1 Tyre print chart* can be taken as the combined print.		
h	is the deck cargo design loading, in m, *see Pt 3, Ch 3, 5 Design loading*		
C	is the stowage factor, *see Pt 3, Ch 3, 5 Design loading*		
n	is the tyre correction factor given in *Table 9.3.3 Tyre correction factor, n*		
a_z	is the vertical acceleration at the location under consideration, *see Pt 3, Ch 9, 9.2 Loading 9.2.3*		
Note Scenario to be assessed using direct calculation, *see Pt 3, Ch 9, 3.5 Deck longitudinals and beams, 3.5.3.*			

3.6 Deck girders and transverses

3.6.1 Where the load on deck girders and transverses is uniformly distributed, the section modulus is to be not less than:

$$Z = 4,75bhl_e^2k \text{ cm}^3$$

where

h = is defined in ~~*Pt 3, Ch 9, 3.5 Deck longitudinals and beams 3.5.1*~~*Table 9.3.7 Design load cases*

b = mean width of plating supported by a deck girder or transverse, in metres.

3.6.2 Where the member supports point loads, *see Table 9.3.7 Design load cases*, with or without the addition of uniformly distributed load, the section modulus is to be based on a stress of $\frac{123,6}{k}$ ~~*N/mm²*~~ N/mm^2, assuming 100 per cent end fixity. For exposed decks an allowance for weather loading of 2,16 kN/m^2 is to be assumed.

Existing sub-Section 3.7 is to be deleted.

~~3.8~~ 3.7 Hatch covers

~~3.8.1~~ 3.7.1 Where wheeled vehicles are to be used, the hatch cover plating is to be not less in thickness than that required by *Pt 3, Ch 9, 3.4 Deck plating*, and the modulus of the stiffeners is to be not less than~~:~~ that required by *Pt 3, Ch 9, 3.5 Deck longitudinals and beams*.

~~$Z = (K_3Pl_e + 0,00167K_4hsl_e^2)k$~~

~~= where the values of K_3 and K_4 are given in *Table 9.3.5 Values of K_3 and K_4* and *P* and *h* are defined in *Pt 3, Ch 9, 3.5 Deck longitudinals and beams 3.5.1*.~~

In no case, however, are the scantlings of plating and stiffeners to be less than would be required as a weather or cargo deck hatch cover, as applicable.

Existing Table 9.3.5 is to be deleted.

~~3.8.2~~ 3.7.2 Where unusual arrangements of hatch cover stiffening are proposed, the scantlings may be determined by direct calculations using a two-dimensional grillage idealisation, and the parameters given in *Table 11.2.3 Effective breadth* e_m *of plating of primary supporting members* in *Pt 3, Ch 11 Closing Arrangements for Shell, Deck and Bulkheads*.

Existing sub-Sections 3.9 to 3.11 are to be renumbered 3.8 to 3.10.

■ *Section 10*
Wind propulsion systems

10.1 General

10.1.1 Vessels that are fitted with a rig used for propulsion by wind force are to comply with the requirements set out in *Pt 3, Ch 7 Wind propulsion systems* of the *Rules and Regulations for the Classification of Special Service Craft, July 2019*.

Part 3, Chapter 10
Welding and Structural Details

■ *Section 2*
Welding

2.9 Inspection of welds

2.9.1 Effective arrangements are to be provided by the Shipbuilder for the inspection of finished welds to ensure that all welding has been satisfactorily completed, and provision and application of NDE shall comply with the general NDE requirements as per *Ch 1, 5.1 General NDE Requirements* of the *Rules for the Manufacture, Testing and Certification of Materials, July 2019*.

2.9.2 All finished welds are to be subjected to non-destructive examination by personnel designated by the Builder in accordance with the requirements specified in *Ch 13, 2.12 Non-destructive examination of welds* of the ~~Rules for Materials~~ *Rules for the Manufacture, Testing and Certification of Materials, July 2019,* and the general NDE requirements as per *Ch 1, 5.1 General NDE Requirements* of the *Rules for the Manufacture, Testing and Certification of Materials, July 2019.*

2.9.3 In addition to the requirements of Pt 3, Ch 10, 2.9 Inspection of welds 2.9.2, a number of checkpoints are to be examined by volumetric examination as detailed in Pt 3, Ch 10, 2.9 Inspection of welds 2.9.4 to Pt 3, Ch 10, 2.9 Inspection of welds 2.9.9., and all NDE shall comply with the general NDE requirements as per *Ch 1, 5.1 General NDE Requirements* of the *Rules for the Manufacture, Testing and Certification of Materials, July 2019*.

Part 3, Chapter 11
Closing Arrangements for Shell, Deck and Bulkheads

■ *Section 2*
Steel hatch covers

2.1 General

2.1.1 The requirements of *Pt 3, Ch 11, 2 Steel hatch covers* are not applicable to hatch covers of bulk carriers, self-unloading bulk carriers, ore carriers and combination carriers. For these ship types, *see Pt 4 Ship Structures (Ship Type)*.

Part 3, Chapter 13
Ship Control Systems

■ *Section 7*
Equipment

7.6 Mooring lines (Equipment Number > 2000)

(Part only shown)

7.6.3 The strength of mooring lines and the number of head, stern, and breast lines for ships with an Equipment Number > 2000 are based on the side-projected area A_1. Side projected area A_1 is to be calculated similar to the side-projected area A according to *Pt 3, Ch 1, 7.1 Calculation of Equipment Number* but considering the following conditions:

(b) Wind shielding of the pier can be considered for the calculation of the side-projected area A_1 unless the ship is intended to be regularly moored to jetty type piers. The lower part of the side-projected area above the waterline for the considered loading condition can be disregarded up to the pier height in the calculation of the side-projected area A_1. ~~Actual height of the pier above the waterline is to be used in the calculation but in general not to exceed 3 m.~~ Where known, the actual height of the pier above the waterline may be used in the calculation. If the pier height cannot be pre-determined, an assumed height may be used. However, in both cases, the pier height shall not exceed 3 m.

■ *Section 8*
Anchor windlass design and testing

8.11 Marking and identification

8.11.1 The windlass is to be permanently marked with the following information:

(a) ~~Nominal size of the cable chain including mean diameter, grade and percentage of the breaking load the windlass is designed to hold (e.g. 100/3/45).~~ The size designation of the windlass (e.g. 100/3/45, where 100 is the nominal diameter of the chain cable in mm, 3 is the numeral in the chain cable steel grade U3, and 45 refers to the holding load expressed as a percentage of the chain cable breaking load).

(b) Maximum anchorage depth, in metres.

Part 4, Chapter 1
General Cargo Ships

■ *Section 5*
Shell envelope plating

5.4 Side shell

(Part only shown)

Table 1.5.3 Side shell plating

Location	Minimum thickness, in mm	
	Longitudinal framing	Transverse framing
(1) Side shell clear of sheerstrake, *see* Notes 1, 2, ~~and~~ 4 and 5	(a) Above $\frac{D}{2}$ from base: The greater of the following: (i) $t = 0{,}001 s_1 \left(0{,}059 L_1 + 7\sqrt{\frac{F_D}{k_L}}\right)$ (ii) $t = 0{,}0042 s_1 \sqrt{h_{T1} k}$	(a) Within $\frac{D}{4}$ from the gunwale: The greater of the following: (i) $t = 0{,}00085 s_1 f_1 \left(0{,}083 L_1 + 10\sqrt{\frac{F_D}{k_L}}\right)$ (ii) $t = 0{,}0042 s_1 \sqrt{h_{T1} k}$
Symbols		
L, D, T, s, S, k_L, *k* as defined in *Pt 4, Ch 1, 1.5 Symbols and definitions 1.5.1* C_w is as defined in *Pt 4, Ch 1, 1.5 Symbols and definitions 1.5.1* Where *L* > 227 m, C_w is not to be taken less than 6,446 m $f_1 = \frac{1}{1+\left(\frac{s}{1000}\right)^2}$ $h_{T1} = T + C_w$ m but need not be taken greater than 1,36T		

h_{T2} = $(T + 0{,}5C_w)$ m but need not be taken greater than 1,2T

s_1 = s, but is not to be taken less than the smaller of

$470 + \frac{L}{0{,}6}$ mm or 700 mm

F_D, F_B = as defined in *Pt 3, Ch 4, 5.7 Local reduction factors*

F_M = the greater of F_D or F_B

L_1 = L but need not be taken greater than 190 m

Note *4*. For the expressions contained in (i) where separate maximum sagging and hogging still water bending moments are assigned, F_D, may be based on the sagging moment and F_B, on the hogging moment.

Note *5*. Outside the Rule minimum region of higher tensile steel as defined in *Pt 3, Ch 3, 2.6 Vertical extent of higher tensile steel* the value of k_L can be taken as 1.

Part 4, Chapter 2
Ferries, Roll On-Roll Off Ships and Passenger Ships

■ ~~*Section 10*~~
~~**Masts and standing rigging**~~

Section 10 is to be deleted in its entirety.

Sections 11 to 13 are to be renumbered 10 to 12.

Part 4, Chapter 7
Bulk Carriers

■ *Section 3*
Longitudinal strength

3.4 Flooded conditions

3.4.2 For self-unloading bulk carriers where the boundary of the conveyor space between the bottom of the cargo hold and the top of the conveyor space is not watertight during seagoing operations, the longitudinal strength in flooded conditions is to be considered using the extent to which flooding can occur, i.e. both the conveyor space and the cargo hold are to be assumed to be flooded. See *Pt 4, Ch 7, 3.4 Flooded conditions 3.4.1*.

Existing paragraphs 3.4.2 and 3.4.3 are to be renumbered 3.4.3 and 3.4.4.

■ *Section 10*
Bulkheads

10.1 General

10.1.5 For self-unloading bulk carriers, the conveyor space is to be maintained watertight at the transverse watertight bulkheads, i.e. watertight gates are to be fitted. The gates are to be of equivalent strength to the unpierced bulkhead, prototype tested, and hose tested in place in accordance with ***Pt 3, Ch 1, 9 Procedures for testing tanks and tight boundaries***. Alternative equivalent arrangements will be specially considered.

10.4 Vertically corrugated transverse watertight bulkheads – Application and definitions

10.4.3 The loads to be considered as acting on the bulkheads are those given by the combination of cargo loads with those induced by the flooding of one hold adjacent to the bulkhead under consideration. The most severe combinations of cargo induced loads and flooding loads are to be used for the determination of the scantlings of each bulkhead, depending on the specified design loading conditions:

(a) homogeneous loading conditions;

(b) non-homogeneous loading conditions (excluding part loading conditions associated with multi-port loading and unloading); and

(c) packed cargo conditions (such as steel mill products).

The individual flooding of loaded and empty holds is to be considered, but the pressure used in the assessment is not to be less than that obtained for flood water alone. Holds containing packed cargo are to be treated as empty holds. For self-unloading bulk carriers where the boundary of the conveyor space between the bottom of the cargo hold and the top of the conveyor space is not watertight during seagoing operations, the loads acting on the bulkheads are to be considered using the extent to which flooding can occur, i.e. both the conveyor space and the cargo hold are to be assumed to be flooded.

Part 4, Chapter 8
Container Ships

■ *Section 15*
Requirements for ships with large deck openings

15.2 Symbols and definitions

15.2.1 The following symbols and definitions are applicable to this Section unless otherwise stated:

Z_Y = actual hull section modulus about the transverse neutral axis at the position considered, in m^3
Z_Z = actual hull section modulus about the vertical neutral axis at the position considered, in m^3
~~ε = shear centre distance below baseline, may be taken as the maximum shear centre distance below baseline of the ship in the midship region, in metres. ε is taken as positive where the shear centre is below the baseline~~
ε = shear centre distance below baseline, in metres, may be taken as $f_\varepsilon\ \varepsilon_m$. Alternatively, the shear centre position along the length of the ship may be obtained by direct calculation. ε is taken as positive where the shear centre is below the baseline
ε_m = maximum shear centre distance below baseline of the ship in the midship region, in metres. ε_m is taken as positive where the shear centre is below the baseline
f_ε = longitudinal distribution factor of shear centre, to be taken as follows:

- -1,0 at the aft end of *L*
- 1,0 between engine room forward bulkhead and 0,8*L* from aft
- -1,0 at the forward end of *L*

Intermediate values are to be determined by linear interpolation

M_S = design still water bending moment at the section under consideration, in kN m
σ_C = combined stress at the position considered.

15.3 Design loadings

(Part only shown)

15.3.1 The design vertical wave bending moments, M_{WC1} and M_{WC2}, at any position along the ship is defined as:

M_{WC1} = 0,05~~05~~ $C_0\ C_{31}\ L^2\ B\ (C_b + 0{,}7)$ kN m
M_{WC2} = 0,05~~05~~ $C_0\ C_{32}\ L^2\ B\ (C_b + 0{,}7)$ kN m
C_{31}, C_{32} = vertical wave bending moment distribution coefficients depending on the longitudinal position from A.P. as defined in *Table 8.15.1 Distribution of wave bending moments*

$$\cancel{C_0 = 11{,}65\left(0{,}6 + 0{,}0942\left(\frac{L}{100} - 1\right)\right)}$$

$$\cancel{C_0 = 0{,}505\ L^{0{,}505}}$$

$$C_0 = 4{,}39 + \frac{L}{60{,}5} - \left(\frac{L}{507}\right)^2$$

L, *B*, C_b are given in *Pt 3, Ch 1, 6 Definitions*~~.~~

The sign convention is given in *Figure 8.15.1 Sign conventions for hull girder loads*

15.3.2 The design horizontal wave bending moments, M_{HC1} and M_{HC2}, at any position along the ship are defined as:

M_{HC1} = ~~0,2063~~ 0,2033 $C_0\, C_{41}\, L^2\, T\, (C_b + 0,7)$ kN m
M_{HC2} = ~~0,2063~~ 0,2033 $C_0\, C_{42}\, L^2\, T\, (C_b + 0,7)$ kN m
C_{41}, C_{42} = horizontal wave bending moment distribution coefficients depending on the longitudinal position from A.P. as defined in *Table 8.15.2 Distribution of horizontal wave bending moments and hydrodynamic torques*

C_0 is defined in *Pt 4, Ch 8, 15.3 Design loadings 15.3.1*

L, T, C_b are given in *Pt 3, Ch 1, 6 Definitions*~~.~~

The sign convention is given in *Figure 8.15.1 Sign conventions for hull girder loads*~~.~~

Table 8.15.2 Distribution of horizontal wave bending moments and hydrodynamic torques

Position		C_{41}	C_{42}	C_{51}	C_{52}	K_{31}	K_{32}
Station	0 (A.P)	0,000	0,000	0,000	0,000	0,000	0,000
	1	–0,016	0,010	~~–0,289~~ -0,181	~~0,235~~ 0,124	0,101	–0,113
	2	–0,046	0,046	~~–0,456~~ -0,343	~~0,525~~ 0,349	0,211	–0,304
	3	–0,097	0,119	~~–0,455~~ -0,439	~~0,754~~ 0,593	0,276	–0,486
	4	–0,154	0,228	~~–0,342~~ -0,433	~~0,910~~ 0,794	0,277	–0,659
	5	–0,208	0,369	~~–0,184~~ -0,387	~~0,988~~ 0,898	0,214	–0,804
	6	–0,242	0,533	~~–0,022~~ -0,285	~~1,000~~ 0,959	0,089	–0,860
	7	–0,247	0,699	~~0,169~~ -0,123	~~0,944~~ 0,930	–0,083	–0,801
	8	–0,217	0,846	~~0,323~~ 0,086	~~0,851~~ 0,849	–0,268	–0,662
	9	–0,153	0,948	~~0,439~~ 0,189	~~0,727~~ 0,723	–0,422	–0,404
	10 (mid – $L_{\text{-pp}}$)	–0,072	0,997	~~0,522~~ 0,245	~~0,585~~ 0,586	–0,485	–0,090
	11	0,014	0,985	~~0,562~~ 0,271	~~0,443~~ 0,411	–0,447	0,232
	12	0,087	0,915	~~0,544~~ 0,263	~~0,288~~ 0,239	–0,338	0,483
	13	0,136	0,802	~~0,472~~ 0,189	~~0,111~~ 0,079	–0,227	0,734
	14	0,158	0,657	~~0,260~~ 0,080	~~–0,011~~ -0,081	–0,094	0,913
	15	0,151	0,502	~~–0,074~~ -0,053	~~–0,121~~ -0,099	0,067	0,998
	16	0,123	0,349	~~–0,366~~ -0,131	~~–0,082~~ -0,058	0,185	0,952
	17	0,083	0,214	~~–0,385~~ -0,149	~~0,039~~ 0,051	0,245	0,821
	18	0,043	0,106	~~–0,198~~ -0,080	~~0,062~~ 0,072	0,220	0,627
	19	0,013	0,034	~~–0,075~~ -0,029	~~0,052~~ 0,040	0,133	0,326
	20 (F.P.)	0,000	0,000	0,000	0,000	0,000	0,000

NOTE Intermediate values are to be determined by linear interpolation.

15.3.3 The design hydrodynamic torques, M_{WTC1} and M_{WTC2}, at any position along the ship are defined as:

M_{WTC1} = $M_{WTCB1} + M_{WTCQ1}$
M_{WTCB1} = $0{,}0728 C_0\, C_{51}\, L\, B^2\, (C_b + 0{,}7)$ kN m
M_{WTCQ1} = $-\,(0{,}65T + \varepsilon)\, Q_{HC1}$ kN m

M_{WTC2} = $M_{WTCB2} + M_{WTCQ2}$
M_{WTCB2} = $0{,}0728\, C_0\, C_{52}\, L\, B^2\, (C_b + 0{,}7)$ kN m
M_{WTCQ2} = $-\,(0{,}65T + \varepsilon)\, Q_{HC2}$ kN m

C_{51}, C_{52} = hydrodynamic torque distribution coefficients depending on the longitudinal position from A.P. as defined in *Table 8.15.2 Distribution of horizontal wave bending moments and hydrodynamic torques*

C_0 is defined in *Pt 4, Ch 8, 15.3 Design loadings 15.3.1*

Q_{HC1} = ~~0,8683~~ 0,8385 $C_0\, K_{31}\, L\, T\, (C_b + 0,7)$ kN
Q_{HC2} = ~~0,8683~~ 0,8385 $C_0\, K_{32}\, L\, T\, (C_b + 0,7)$ kN
K_{31}, K_{32} = horizontal wave shear force distribution coefficients depending on the longitudinal position from A.P. as defined in *Table 8.15.2 Distribution of horizontal wave bending moments and hydrodynamic torques*

L, B, T, C_b, are given in *Pt 3, Ch 1, 6 Definitions*~~.~~

ε is given in *Pt 4, Ch 8, 15.2 Symbols and definitions 15.2.1*

The sign convention is given in *Figure 8.15.1 Sign conventions for hull girder loads*~~.~~

Part 4, Chapter 12
Dredging and Reclamation Craft

■ *Section 1*
General

1.3 Class notations

(Part only shown)

1.3.2 The class notations will be assigned to ships based on the following:

(b) Where dredger types listed in ~~*Pt 4, Ch 12, 1.3 Class notations 1.3.1.(a)*,~~ *Pt 4, Ch 12, 1.3 Class notations 1.3.1.(b)*, ~~and~~ *Pt 4, Ch 12, 1.3 Class notations 1.3.1.(c)*, *Pt 4, Ch 12, 1.3 Class notations 1.3.1.(e)* and *Pt 4, Ch 12, 1.3 Class notations 1.3.1.(f)* perform dredging operations at reduced freeboards, resulting in a dredging draught (T_m) greater than the summer draught ~~and without a dredging service area restriction~~, the class notation will be extended as follows: **'dredging draught T_m of … metres in sea states with H_s <... metres'** and will be subject to special requirements of National Authorities, *see* *Pt 4, Ch 12, 1.6 Requirements for dredgers operating at reduced freeboards 1.6.1*.

~~(c) Where dredger types listed in *Pt 4, Ch 12, 1.3 Class notations 1.3.1.(a)*, *Pt 4, Ch 12, 1.3 Class notations 1.3.1.(b)* and *Pt 4, Ch 12, 1.3 Class notations 1.3.1.(c)* perform dredging operations at reduced freeboards, resulting in a dredging draught (T_m) greater than the summer draught but with a dredging service area limited to within 21 nautical miles from shore, the class notation will be extended as follows: **'dredging within 21 miles from shore at a dredging draught T_m of … metres'** and will be subject to special requirements of National Authorities, *see* *Pt 4, Ch 12, 1.6 Requirements for dredgers operating at reduced freeboards 1.6.1* and *Pt 4, Ch 12, 1.6 Requirements for dredgers operating at reduced freeboards 1.6.2*.~~

Existing point (d) has been renumbered (c).

■ *Section 2*
Longitudinal strength

2.4 Design vertical wave bending moments

2.4.2 For the dredging conditions at draught T_m, the design hull vertical wave bending moment at amidships, M_{wd}, is given by the following expression:

$$M_{wd} = f_{wd} f_2 M_{wo}$$

where

T_m is the dredging draught. T_m is not to be taken less than draught, T

M_{wo} is determined from *Pt 3, Ch 4, 5.2 Design vertical wave bending moments*, using C_{bm} in place of C_b

f_2 is given in *Pt 3, Ch 4, 5.2 Design vertical wave bending moments*

f_1 and f_{wd} are defined in *Table 12.2.1 Ship service factors f_1 and f_{wd}*.

Existing Table 12.2.1 Ship service factors f_1 and f_{wd} has been deleted and replaced with below.

Table 12.2.1 service factors f_1 and f_{wd} for ships with hopper or split hopper

Prerequisite notation	Class Notation	f_1	f_{wd}
✠ 100A1 …	**dredging draught T_m of … metres in sea state with H_s < … metres**	1,00	f_{uds}
✠ 100A1 … Specified coastal service + specified area	**dredging draught T_m of … metres in sea state with H_s < … metres**	1,00	f_{uds} *see* Note 2
✠ 100A1 … Extended protected waters service + specified area	**dredging draught T_m of … metres in sea state with H_s < … metres**	0,80	f_{uds} *see* Note 3
✠ A1 … protected waters service		0,65	0,35
Symbols			
$f_{uds} = 2{,}2 H_s L^{-0{,}48}$, no to be taken less than 0,35 and not greater than the applicable f_1			

H_s = significant wave height for the dredging operation at the considered dredging draught T_m

Note 1. The wave reduction factors may only be used for dredgers complying with the applicable requirements of *Pt 4, Ch 12, 1.6 Requirements for dredgers operating at reduced freeboard 1.6.1*.
Note 2. With a maximum significant wave height of *H*s = 3,5m
Note 3. With a maximum significant wave height of *H*s = 3m

■ *Section 8*
Spoil space and well structure

8.2 General

8.2.4 **Ladder well cofferdams.** Ladder wells of ~~trailing suction dredgers~~ cutter suction dredgers and bucket dredgers are to be isolated from the remainder of the dredger's structure by local cofferdams at least 600 mm wide, or are to be otherwise protected to prevent serious flooding due to the well side plating being breached by the ladder structure should this be damaged in service. Ladder wells of bucket dredgers are to be isolated by cofferdams, the extent and widths of which are to be sufficient to contain any damage to the well side bulkheads or bottom shell plating that could result from the impact of large objects brought up in the dredge buckets. In way of the buckets the cofferdam may be extended outboard in the form of a local watertight double bottom.

© Lloyd’s Register Group Limited 2020

Published by Lloyd’s Register Group Limited
Registered office (Reg. no. 08126909)
71 Fenchurch Street, London, EC3M 4BS
United Kingdom

Lloyd’s Register and variants of it are trading names of Lloyd’s Register Group Limited, its subsidiaries and affiliates. For further details please see http://www.lr.org/entities

Lloyd's Register Group Limited, its subsidiaries and affiliates and their respective officers, employees or agents are, individually and collectively, referred to in this clause as ‘Lloyd's Register’. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.